

Knowledge and practice of foot care among Libyan diabetic patients

Amal S.M. Atair*  , Muna A.I. Mohamed , Aya N. Abdelfadel, Heba A. Ahmed and Sarah A. Atiya

Department of Pharmacology, Faculty of Pharmacy, Omar Al-Mukhtar University, Al-Bayda, Libya

*Author to whom correspondence should be addressed

Received: 20-01-2023, **Revised:** 12-02-2023, **Accepted:** 20-02-2023, **Published:** 31-03-2023

Copyright© 2023. This open-access article is distributed under the *Creative Commons Attribution License*, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

HOW TO CITE THIS

Atair et al. (2023) Knowledge and practice of foot care among Libyan diabetic patients.
Mediterr J Pharm Pharm Sci. 3 (1): 35-42. [Article number: 102]. <https://doi.org/10.5281/zenodo.7771360>

Keywords: Al-Bayda, diabetes mellitus, foot care, knowledge, pharmacist, practice

Abstract: Diabetes mellitus is a common and chronic metabolic disorder. Uncontrolled diabetes mellitus leads to body organ damage if not treated properly. Educational intervention is necessary from healthcare providers such as pharmacists to prevent or reduce organ damage and complications among diabetic patients. Several studies have demonstrated the contribution of pharmacists in achieving a better control of diabetes mellitus. Thus, this study intended to assess the knowledge and practice regarding foot care among Libyan diabetic patients in Al-Bayda city. In addition, to determine the association between knowledge and practice regarding diabetic foot care with selected demographic variables. This is a cross-sectional study conducted at Diabetes Center Aljabal Al akhdar in Al-Bayda between April and August 2022. A total of 400 participants with diabetes were enrolled and interviewed by using a self-design questionnaire for knowledge and practice of foot care after taking verbal agreement. Data was analyzed by using SPSS software version 26.0. In this study, 191 subjects were male (47.8%) and 209 subjects (52.3%) were female. On the topic of foot care, 51.8% of the participants stated they did know how to perform correct foot hygiene and 33.5% stated that drying should consist of passing a towel between their toes. Female subjects statistically had more knowledge than male subjects on the right footwear and correct way of nail cutting ($p < 0.01$ and $p < 0.001$, respectively). In relation to practice, the frequency of patients with good practice was 126 (31.5%) and with poor practice was 274 (68.5%). Evaluating the parameters dry, moisturize and nail cutting, women showed a significant difference in relation to men, with a high significance level in the three parameters. In conclusion, the knowledge and practice of foot care in Libyan patients with diabetes were poor. So, an educational program is recommended to improve the awareness of foot care. Diabetic patients should be provided information about self-care of their feet by health care providers such as pharmacists to prevent and delay the onset of foot complications and improve the quality of life.

Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia [1]. The prevalence of DM is increasing every year in most countries. According to WHO, it is estimated that there were 88,000 patients with DM in Libya during the year of 2000. By 2030, the incidence of diabetes globally reaches 245,000 [2]. Numerous serious complications are caused by uncontrolled diabetes that will increase morbidity and mortality. These complications are macrovascular such as coronary artery diseases or microvascular like

nephropathy, retinopathy, neuropathy and diabetic foot ulcer, DFU [1]. Data reported that 20.0% of the people who have DM are at risk of developing DFU as a result of neuropathy [3]. The prevalence of DFU was 6.3% and estimated in North America (13.0%) while 2.2% in Europe, 7.2% in Africa, 5.5% in Asia and 1.5% in Australia [4]. The prevalence of DFU is assumed to increase in Africa and is associated with increased complications with peripheral vascular disease and neuropathy. These complications increase the risk of amputation and affect the quality of life of DM patients [5]. According to the International Diabetic Federation (IDF), the prevalence of amputation worldwide is around 200 000 individuals per year [6]. In the USA, the incidence of amputation arrived at 230 patients each day [7]. In Libya, a previous study designed in Benghazi to assess long-term complications among type 2DM reported 1.1% of patients had their legs amputated below knee [8]. Patients with DFU are 2.5 times at risk of death more than diabetic patients who do not have DFU [9]. DFU is a combination of different pathological processes (neuropathy, hyperglycemia and vascular) that is explains why treating DFU is difficult and expensive because such studies reported that the cost to treat DFU is more than twice that of any other chronic ulcer [10]. In the USA, the total cost of treating diabetic foot disease ranges from 9.0 to 13.0 billion dollars [11].

The risk of amputation can be controlled by elevating awareness and adopting care strategies and proper measures, such as educating patients about diabetes, frequent foot examination and metabolic control are examples of these measures. Healthcare providers such as pharmacists have a major role in reducing the incidence of DFU. Indeed, a recent study has demonstrated that pharmacist-led educational intervention has a positive impact on the progression of diabetic complications. The signs and symptoms of DFU were significantly improved in the intervention group as compared with the control group. Understanding the level of knowledge and practice in DM patients is important to control diabetes and to delay the appearance of its complications. Where poor level of knowledge and practice are related to risk factors of DFUs. Foot care is a key to prevent DFU. Adequate knowledge and information about foot care will be prepared for individuals with the ability to do good practice in order to preventing DFUs. Foot care practice includes exercise, controlling diet, daily foot examination, foot hygiene and the correct way of cutting the nail. Medical physicians provide foot care with little attention and concentrate on diagnosis and therapeutic measures more than preventive and educational programs. Therefore, this study was aimed and designed to assess the knowledge and practice of foot care among Libyan patients with diabetes mellitus.

Materials and methods

This is a cross-sectional study consisting of 400 patients with DM at Diabetes Center Aljabal Alakhdar in Al-Bayda from April to August 2022. The self-prepared questionnaire was divided into three parts where data were collected through direct self-interviews. The three sections are: 1- demographic data including age, gender and education level, 2- five questions about knowledge of diabetic foot care where the scores of knowledges were divided into good knowledge (4-5) and poor knowledge (0-3) related to patient's answers and 3- eight questions on the practice of diabetic foot care and the scores of practices were divided into good practice (5 and above) while poor practice (4 and below). Ethical approval has been obtained from the ethics committee of Omar Al-Mukhtar University (0012-2022). A verbal agreement with patients was obtained before collecting data and interviewing.

Statistical analysis: Data was analyzed by Statistical Package for Social Science (SPSS) version 26.0 and was presented as frequency and percentage by using descriptive statistics. Relationships between demographic data and knowledge and practice of diabetic foot care obtained by Chi-square test. A value of less than 0.05 was considered significant and less than 0.01 was considered highly significant.

Results

Demographic data of the participants: **Table 1** shows the age, gender and level of education of the Libyan participants with DM. With regard to gender, the ratio of male to female patients was found almost to be similar. The number of male subjects was 191 with a percentage of 47.8% and the female subjects were 209 with a percentage of 52.3%. Regarding the age, the majority of the participants ranged from 41 to 60 years old (52.2%) and the lowest group was at the age of ≤ 20 years (2.5%) and ≥ 80 years old (3.8%). The education level of the participants is presented in **Table 1** which shows that the highest educated group has a university degree (30.2%) then the secondary level with a percentage of 24.8%. 23.8% of the participants were illiterate and almost the same (21.2%) of the participants were with basic education.

Table 1: Demographic data of the Libyan participants with diabetic mellitus

Variables	Frequency	Percentage
Age, years		
≤ 20	10	02.5%
02-40	40	10.0%
41-60	209	52.2%
61-80	126	31.5%
≥ 81	15	03.8%
Gender		
Male	191	47.8%
Female	209	52.2%
Education		
Illiterate	95	23.8%
Primary	85	21.2%
Secondary	99	24.8%
Graduate	121	30.2%

Participant's knowledge about various aspects of foot care: During the interviews, when investigated their knowledge regarding foot care (**Table 2**), almost half of the participants (51.8%) stated that they did know how to perform correct foot hygiene while 33.5% stated that drying should consist of passing a towel between their toes. Only 7.5% did not know what a person with diabetes should observe in their feet and 34.0% of the participants answered that comfortable and closed footwear is an ideal. However, in **Table 2**, the response of I do not know with all the variables was very low and ranged less than 10.0%. The scoring of knowledge was categorized into yes (know) and no (not know). The frequency of patients with yes was 38 (9.5%) and with no was 362 (90.5%).

Participants' practice related to foot care: In **Table 3**, the response of patients to practice, can be measured by categorizing the scoring of practice of foot care into good and poor practice foot care. Good practice was defined if the correct number of question answers is 5 and above of 8 questions and poor practice is 4 and below of 8 questions. The frequency of patients with good practice was 126 (31.5%) and poor practice was 274 (68.5%).

Association between gender, knowledge and practice of foot care: **Figure 1 and Table 4** show an analysis of knowledge and practice in relation to gender of the participants. The findings showed that female participants statistically had greater knowledge than the males about the right footwear to use, being that 76 women answered comfortable and closed, with a highly significant difference between the gender ($p < 0.01$) and females had highly significant additional knowledge about the correct way of nail cutting ($p < 0.001$). Evaluating the parameters for drying, moisturizing and nail cutting, women showed a significant difference in relation to men with highly significant differences of $p < 0.001$, $p < 0.001$ and $p < 0.01$, respectively, being that of the 103 who stated they dried their feet, 73 were women of the 185 who answered they moisturized their feet, 121 were women and of the 367 who nail cutting, 198 were women (**Figure 1 A, B, C and D**).

Association between education level, knowledge and practice of foot care: **Table 5** shows the analysis of knowledge and practice data of the participants in relation to education level. The findings indicated that the practice of foot drying is highly statistically significantly associated with the level of education whereas 103 practices of foot drying was also highly significant found in the graduated participants ($p < 0.01$).

Table 2: Participant's knowledge about various aspects of foot care

Variables	Frequency	Percentage
Correct hygiene		
With warm water and soap	207	51.8%
With cold water and soap	90	22.5%
I did not	103	25.8%
Ideal drying		
With a towel, without drying between toes	128	32.0%
With a towel, drying between toes	134	33.5%
No need to dry	120	30.0%
I do not know	018	04.5%
Observing your feet		
Only when there is tingling and numbness	292	73.0%
No need to observe feet	078	19.5%
I do not know	030	07.5%
Ideal footwear		
Tight	004	01.0%
Loose	074	18.5%
Comfortable and closed	136	34.0%
Comfortable and open	175	43.8%
I do not know	011	02.8%
Correct nail cutting		
Rounded	127	31.8%
Straight	131	32.8%
Either rounded or straight	116	29.0%
I do not know	026	06.5%

Table 3: Participant's practice related to foot care

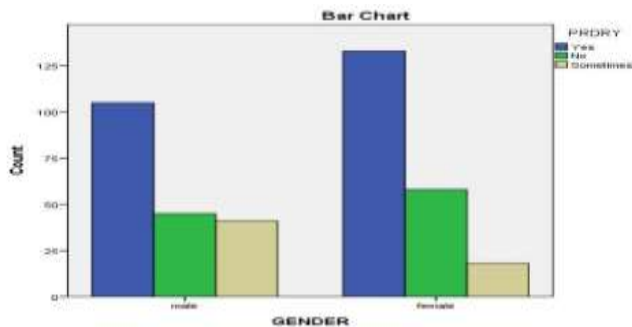
Foot care aspects	Description	Frequency	Percentage
Inspection	Daily	053	13.0%
	Every two days	024	06.0%
	Weekly	084	21.0%
	Not inspected	239	59.7%
Washing	More than one time per day	379	94.7%
	One time per day	012	03.0%
	Not washing regularly	009	02.3%
Drying	Yes	103	25.7%
	No	238	59.5%
	Sometimes	059	14.8%
Moistening	Yes	185	46.3%
	No	102	25.5%
	Sometimes	113	28.2%
Nail cutting	Yes	367	91.8%
	No	012	03.0%
	Sometimes	021	05.2%
Bare foot	Yes	110	27.5%
	No	168	42.0%
	Sometimes	122	30.5%
Wearing socks	Yes	142	35.5%
	No	073	18.2%
	Sometimes	185	46.3%
Wearing diabetic foot	Yes	101	25.2%
	No	263	65.8%
	Sometimes	036	09.0%

Table 4: Association between gender, knowledge and practices of foot care

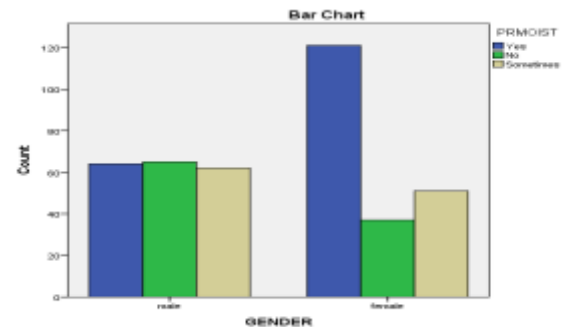
Variables	Male	Female	P value
Nail cutting			
Rounded	070	057	0.001
Straight	040	091	
Either rounded or straight	059	057	
I do not know	015	011	
Foot wear			
Tight	003	001	0.004
Loose	035	039	
Comfortable and closed	060	076	
Comfortable and open	086	089	
I do not know	007	004	
Foot care practice			
Dry	030	073	0.001
Moist	064	121	0.001
Nail cutting	169	198	0.007

Table 5: Association between education level, knowledge and practices of foot care

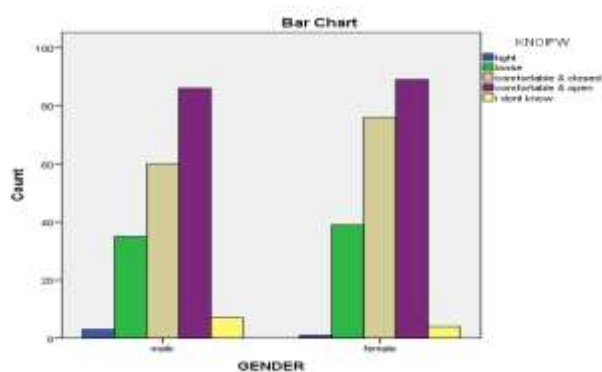
Variable	Illiterate	Primary	Secondary	Graduate	P value
Foot care practice dry	15	24	26	38	0.009



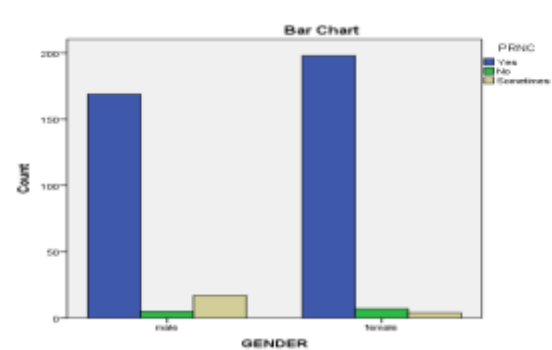
A



C



B



D

Figure 1: Association between gender and knowledge of ideal foot wearing (A), gender and practice of drying (B), gender and practice of foot moistening (C) and gender and practice of nail cutting (D)



Discussion

This study was designed to assess knowledge and practice of foot care in Libyan diabetic patients. The findings were found in most of the patients indicating lower score of knowledge (90.0%) and practice (70.0%) toward foot care which is similar to a previous Malaysian study [12] where the majority of the patients had poor knowledge and practice toward diabetic foot care. Several other studies also are in line with the present study for foot care practice which was carried out on Thailand [13] and Nepal [14] as well as Saudi Arabia [15]. A good knowledge about foot care can delay the risk of complications which leads to foot ulcers and amputation. In some studies, it was reported a higher level of knowledge about foot care [16, 17]. This variation in the findings of the level of knowledge could be attributed to the difference in literacy or educational programs and training supplied by healthcare providers [17].

To assess the factors that may be related to knowledge of foot care, a significant association between females with knowledge of the correct way of nail cutting and ideal foot wearing was observed. This may relate to the fact that women are more caring and observing the appearance of their feet. Also, unlike most women who wear high-heeled shoes, women with DM in the present sample were more aware of the importance of wearing comfortable shoes to avoid foot complications, as well as wearing closed shoes, due to women's commitment to the standards of the Islamic society. According to different questions about the knowledge of foot care, the present study showed about half of the participants did know how to perform foot hygiene and according to the practice of daily washing and foot inspection. There is no difference between females and males due to Muslims populations praying five times per day where they have washed their feet before praying and this habit helps the patients to inspect their feet daily. Which is similar to the previous studies conducted in Saudi Arabia and Pakistan [18, 19]. In another study conducted in Iraq, the correct measure that the majority of the patients knew and practiced was washing their feet daily [20]. They attributed this practice to religious reasons and not to diabetic care. In relation to washing their feet with warm water, more than half of the participants in this study were aware of the fact that feet should be washed daily with warm water and that the temperature of the water should be checked before washing. This was inconsistent with the results obtained in Malaysia where the majority of the patients did not check the temperature of water before washing their feet [12].

In general, the score of foot care practice was poor in the current study. Thus, about 25.0% of the participants dry between their toes after washing and 46.3% moisturize their feet daily. This is similar to the studies in Nigeria [21] which found the level of foot care practice was low and another study conducted in Malaysia examined 30.0% of diabetic patients who had good foot care practice [22]. These differences in data between the previous studies may be related to the study population or in methods of data collection. The present study showed that the practice of self-care of feet is highly significantly different among males and females regarding ideal drying, moisturizing and nail cutting. In addition, the practice of foot care more in female than male subjects were found that may be attributed to women taking care of their feet more than men whereas men related to social culture not caring about foot appearance. The women were more self-care practice with the daily routine of foot care like moisturizing and massaging their lower limb which is similar to the previous studies [23, 24]. This is in agreement with the Egyptian study where gender had no role in determining the level of knowledge and practice of diabetic foot care [25]. Another study showed that males were usually hesitant to reveal their health problems and ask for professional care. Males presented a greater deficit in self-care compared to females [26]. According to age and level of education, there is only one study that reported no significant association between age, and level of education with knowledge and practice of foot care in Malaysia [12]. This is in agreement with the current study with respect to the age of the patient. However, the present finding indicated a significant association between level of education and practice of drying where people with a high level of education are expected to have more information about DM and its complications meaning that education may lead to awareness of diabetic foot care principles and improved basic information



to prevent foot ulceration. According to education level and knowledge of foot care, no significant association was found in the current study which is inconsistent with the previous study in Tanzania reporting low scores of knowledges were associated with low educational level [27]. It may be assumed that people did not have enough time or had heavy work. In addition, the community level did not supply good information about DM for patients with different education levels. Knowledge and practice of foot care must be available in a diabetic patient where knowledge of the importance of foot care without applying it does not achieve the desired outcome. The effect of pharmacists on diabetic complications is positive in nature and it is specific effect on the diabetic foot which is a common complication of DM [28]. Indeed, some predictors of the diabetic foot are improved in the presence of a pharmacist during the follow-up. This study was not on the general complications of DM and not on the role of the pharmacist but it focuses on the diabetic foot, however, the intervention of healthcare professionals such as pharmacists certainly improves signs and symptoms belonging to the diabetic foot. The improvement in all the predictors of the diabetic foot started progressing from the first follow-up.

Conclusion: The present findings confirm that knowledge and practice of foot care among Libyan diabetic patients are poor, thus, education and training of the patients are highly needed.

Acknowledgments: The authors wish to thank all the individuals who helped throughout the study. Special thanks to the Diabetic Center of Aljabal Al Akhdar in Al-Bayda, Libya.

Author contribution: ASA & MAM conceived, designed the study, collected data and performed the analysis. ANA, HAA & SAA have contributed in collecting data and contributing in analysis. All authors have drafted and revised the manuscript as well as approved the final version of the manuscript and agreed to be accountable for its contents.

Conflict of interest: The authors declare the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethical issues: Including plagiarism, informed consent, data fabrication or falsification and double publication or submission were completely observed by the authors.

Data availability statement: The raw data that support the findings of this article are available from the corresponding author upon reasonable request.

Author declarations: The authors confirm that all relevant ethical guidelines have been followed and any necessary IRB and/or ethics committee approvals have been obtained.

References

1. American Diabetes Association (2020) Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2020. *Diabetes care*. 43 (Suppl 1): S14-S31. doi: 10.2337/dc20-S002
2. Wild S, Roglic G, Green A, Sicree R, King H (2004) Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care*. 27 (5): 1047-1053. doi: 10.2337/diacare.27.5.1047
3. Paisey RB, Abbott A, Levenson R, Harrington A, Browne D, Moore J (2018) South-West Cardiovascular Strategic Clinical Network peer diabetic foot service review team. Diabetes-related major lower limb amputation incidence is strongly related to diabetic foot service provision and improves with enhancement of services: peer review of the South-West of England. *Diabetic Medicine*. 35 (1): 53-62. doi: 10.1111/dme.13512
4. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y (2017) Global epidemiology of diabetic foot ulceration: A systematic review and meta-analysis. *Annals of Medicine*. 49 (2): 106-116. doi: 10.1080/07853890.2016.1231932.
5. Bos M, Agyemang C (2013) Prevalence and complications of diabetes mellitus in Northern Africa, a systematic review. *BMC Public Health*. 13 (1): 1-7. doi: 10.1186/1471-2458-13-387
6. International Diabetes Federation (2015) *IDF Diabetes Atlas*. 7th edition. Karakas's print, USA. ISBN: 978-2-930229-81-2.
7. Narres M, Kvitkina T, Claessen H, Claessen H, Droste S, Schuster B, Morbach S, Lcks A (2017) Incidence of lower extremity amputations in the diabetic compared with the non-diabetic population: a systematic review. *PLoS One*. 12 (8): e0182081. doi: 10.1371/journal.pone.0182081



8. Roaeid RB, Kadiki OA (2011) Prevalence of long-term complications among Type 2 diabetic patients in Benghazi, Libya. *Journal of Diabetology*. 2 (3): 3. IP: 102.38.1.128.
9. Walsh JW, Hoffstad OJ, Sullivan, MO, Margolis, DJ (2016) Association of diabetic foot ulcer and death in a population-based cohort from the United Kingdom. *Diabetic Medicine*. 33 (11): 1493-1498. doi: 10.1111/dme.13054
10. Hurlow JJ, Humphreys GJ, Bowling FL, McBain, AJ (2018) Diabetic foot infection: a critical complication. *International Wound Journal*. 15 (5): 814-821. doi: 10.1111/iwj.12932
11. Rice JB, Desai U, Cummings AKG, Birnbaum HG, Skornicki M, Parsons NB (2014) Burden of diabetic foot ulcers for Medicare and private insurers. *Diabetes Care*. 37 (3): 651-658.9. doi: 10.2337/dc13-2176
12. Muhammad-Lutfi AR, Zaraiyah MR, Anuar-Ramadhan IM (2014) Knowledge and practice of diabetic foot care in an in-patient setting at a Tertiary Medical Center. *Malaysian Orthopaedic Journal*. 8 (3): 22-26. doi. 10.5704/MOJ.1411.005
13. Kim SY, Hongsranagon P (2008) Preventive behaviors regarding foot ulcers in diabetes type II patients at BMA Health Center No. 48, Bangkok, Thailand. *Journal of Health Research*. 22 (suppl): 21-28. doi: Nil.
14. Gautam A, Bhatta DN, Aryal UR (2015) Diabetes related health knowledge, attitude and practice among diabetic patients in Nepal. *BMC Endocrine Disorders*. 15: 25. doi: 10.1186/s12902-015-0021-6
15. Saadia Z, Rushdi S, Alsheha M, Saeed H, Rajab M (2010) A study of knowledge attitude and practices of Saudi women towards diabetes mellitus. A (KAP) study in Al-Qassim region. *Internet Journal of Health*. 11 (2): 1-7. doi: Nil.
16. Haq NU, Durrani P, Nasim A, Riaz S (2017) Assessment of knowledge and practice of diabetes mellitus patients regarding foot care in tertiary care hospitals in Quetta, Pakistan. *Specialty Journal of Medical Research and Health Science*. 2 (4): 35-43. doi: Nil.
17. Gul N (2010) Knowledge, attitudes and practices of type 2 diabetic patients. *Journal of Ayub Medical College*. 22 (3): 128-131. PMID: 22338437.
18. Al-Hariri MT, Al-Enazi AS, Alshammari DM, Bahamdan AS, Al-Khtani SM, Al-Abdulwahab AA (2017) Descriptive study on the knowledge, attitudes and practices regarding the diabetic foot. *Journal of Taibah University Medical Sciences*. 12 (6): 492-496. doi: 10.1016/j.jtumed.2017.02.001
19. Hasnain S, Sheikh NH (2009) Knowledge and practices regarding foot care in diabetic patients visiting diabetic clinic in Jinnah Hospital, Lahore. *JPMA. The Journal of the Pakistan Medical Association*. 59 (10): 687-690. PMID: 1983683.
20. Saber HJ, Daoud AS (2018) Knowledge and practice about the foot care and the prevalence of the neuropathy among a sample of type 2 diabetic patients in Erbil, Iraq. *Journal of Family Medicine and Primary Care*. 7 (5): 967-974. doi: 10.4103/jfmpc.jfmpc_163_18
21. Desalu OO, Salawu FK, Jimoh AK, Adekoya AO, Busari OA, Olokoba AB (2011) Diabetic foot care: self reported knowledge and practice among patients attending three tertiary hospital in Nigeria. *Ghana Medical Journal*. 45 (2): 60-65. doi: 10.4314/gmj.v45i2.68930
22. Hamidah H, Santhna LP, Ruth Packiavathy RD, Suraya AM, Yap WC, Samsiah M, Das S (2012) Foot care strategy for the newly diagnosed DM Type 2 patients with low educational and socio-economic background: a step towards future. *La Clinica terapeutica*. 163 (6): 473-478. PMID: 23306740.
23. Almeida SAD, Silveira MM, Espírito Santo PFD, Pereira RDC, Salomé GM (2013) Avaliação da qualidade de vida em pacientes com diabetes mellitus e pé ulcerado. 28 (1): 142-146. doi: 10.1590/S1983-5175201000100024
24. Bragança CM, Gomes IC, Fonseca MRCC, Colmanetti MNDS, Vieira MG, Souza MDF (2010) E pé ulcerado. *Revista Brasileira de Cirurgia Plástica Avaliação das práticas preventivas do pé diabético*. *Journal of Health Science Institute*. 28 (2): 159-163. doi: Nil.
25. Abu-elenin MM, Elshoura AA, Alghazaly GM (2018) Knowledge, practice and barriers of foot self-care among diabetic patients at Tanta University Hospitals, Egypt. *The Egypt Journal of Community Medicine*. 36 (4): 94-102. doi: 10.21608/EJCM.2018.23001
26. Rossaneis MA, Haddad M, Mathias TA, Marcon, SS (2016) Differences in foot self-care and lifestyle between men and women with diabetes mellitus. *Revista Latino-Americana de Enfermagem*. 24: e2761. doi: 10.1590/1518-8345.1203.2761
27. Chiwanga FS, Njelekela MA (2015) Diabetic foot: prevalence, knowledge, and foot self-care practices among diabetic patients in Dar el Salaam, Tanzania-a cross-sectional study. *Journal of Foot Ankle Research*. 8 (1): 20. doi: 10.1186/s13047-015-0080-y
28. Khan AH, Iqbal ZM, Sulaiman SAS, Ibrahim A, Binti NS, Azmi Y, Iqbal MS, Albassam AA (2021) Impact of pharmacist-led educational intervention on predictors of diabetic foot at two different hospitals of Malaysia. *Journal of Pharmacy and BioAllied Sciences*. 13 (1): 108-115. doi: 10.4103/jpbs.JPBS-475-20